

Amendments to the Claims:

This listing of claims replaces all prior versions, and listings, of claims in the application.

Listing of Claims:

1-78. (canceled)

79. (currently amended) A method, performed by a device, the method comprising:

storing, in a memory of the device, search query-search document associations in a database, each search query-search document association representing a one-to-one pairing of an issued search query and a search document;

receiving, by a processor of the device, a search query;

identifying, by the processor, a set of search result documents using the received search query; and

formulating, by the processor, a search query refinement suggestion based on at least one of the search result documents and at least one search query-search document association in the database.

80. (previously presented) The method of claim 79, wherein the formulating the search query refinement suggestion comprises:

identifying search documents of the search query – search document association that match the at least one search result document within the database; and

using the issued search queries associated with the identified search documents in the formulating.

81. (previously presented) The method of claim 80, further comprising:
assigning weights to the search query-search document associations in the database based on relevancies of the search documents to the issued search queries in the search query-search document associations; and
storing the weights in the database.

82. (previously presented) The method of claim 81, wherein the formulating the search query refinement suggestion further comprises:
computing term vectors using terms in the issued search queries of the search query-search document associations and the assigned weights.

83. (previously presented) The method of claim 82, wherein the formulating the search query refinement suggestion further comprises:
normalizing the term vectors; and
forming clusters of the identified search documents based on distances of each of the normalized term vectors from a common origin.

84. (previously presented) The method of claim 83, wherein the formulating the search query refinement suggestion further comprises:

multiplying, by a constant, those of the normalized term vectors that include constituent terms with the received search query to downwardly weight the constituent terms to produce an independence of the clusters from the terms of the received search query.

85. (previously presented) The method of claim 83, further comprising:
assigning a relevance score to the at least one search result document,
wherein the formulating the search query refinement suggestion further includes:
ranking the clusters based on the relevance score and a number of identified
search documents in the clusters.

86. (previously presented) The method of claim 85, wherein the formulating the search query refinement suggestion further comprises:
selecting ones of the clusters based on the ranking.

87. (previously presented) The method of claim 86, wherein the formulating the search query refinement suggestion further comprises:
computing a centroid for each of the selected clusters; and
determining a score for each unique search query in the selected clusters based on the centroids.

88. (previously presented) The method of claim 87, wherein the computing the score for each of the unique search queries comprises:

multiplying a frequency of the issued search queries in the search query-search document associations in the selected clusters times a length of a distance vector measured from the term vectors of the issued search queries in the search query-search document associations to the centroids of the selected clusters.

89. (previously presented) The method of claim 87, wherein the formulating the search query refinement suggestion further comprises:

designating a name to each of the selected clusters based on the computed scores of the unique search queries of the selected clusters.

90. (previously presented) The method of claim 89, wherein the formulating the search query refinement suggestion further comprises:

comparing the computed scores of the unique search queries of the named clusters to a threshold; and

selecting those cluster names that exceed the threshold to obtain the search query refinement suggestions.

91. (previously presented) The method of claim 90, wherein the formulating the search query refinement suggestion further comprises:

sorting the obtained search query refinement suggestions based on a relevance score assigned to each of the search result documents corresponding to the identified search documents associated with the named clusters and a number of the identified search documents in the named clusters.

92. (previously presented) The method of claim 91, further comprising:
presenting the sorted search query refinement suggestions to a user.
93. (previously presented) The method of claim 91, further comprising:
augmenting the sorted set of search query refinement suggestions with
supplemental queries that include one or more of the terms of the search query and
negated forms of all terms appearing in the set of search query refinement suggestions,
but not appearing in the search query; and
presenting the augmented search query refinement suggestions to a user.
94. (previously presented) A system comprising:
means for storing search query-search document associations in a database, each
search query-search document association representing a one-to-one pairing of a stored
search query and a search document;
means for receiving a search query;
means for identifying a set of search result documents using the received search
query; and
means for formulating a search query refinement suggestion based on at least one
of the search result documents and at least one search query-search document association
in the database relating to the at least one search result document.

95. (currently amended) A computer-readable memory device ~~medium~~ configured to store instructions executable by at least one processor to cause the at least one processor to:

store search query-search document associations, each search query-search document association representing a one-to-one pairing of an issued search query and a search document;

receive a search query;

identify a set of search result documents using the received search query; and

formulate a search query refinement suggestion based on at least one of the search result documents and at least one search query-search document association of the stored search query-search document associations.

96. (currently amended) A method, performed by a device, the method comprising:

storing, in a memory of the device, a plurality of query-document associations, each query-document association including a one-to-one pairing of an issued search query and a stored search document;

receiving, by a processor of the device, a search query from a client device;

identifying, by the processor, a set of search result documents using the received search query;

identifying, by the processor, search result documents ~~to~~ in the identified set of search result documents that match stored search documents;

identifying, by the processor, for each of the stored search documents that matches one of the search result documents, a query-document association in the plurality of query-document associations; and

formulating, by the processor, a search query refinement suggestion for the received search query based on the identified query-document associations for each of the stored search documents that matches one of the search result documents.

97. (previously presented) The method of claim 96, wherein the formulating the search query refinement suggestion comprises:

using the issued search queries associated with the identified query-document associations in the formulating.

98. (previously presented) The method of claim 97, further comprising:
assigning weights to the stored query-document associations based on relevancies of the search documents to the issued search queries in the query-document associations;
and

storing the assigned weights.

99. (previously presented) The method of claim 98, wherein the formulating the search query refinement suggestion further comprises:

computing term vectors using terms in the issued search queries of the identified query-document associations and the assigned weights.

100. (previously presented) The method of claim 99, wherein the formulating the search query refinement suggestion further comprises:

normalizing the term vectors; and

forming clusters of the search documents in the identified query-document associations based on distances of each of the normalized term vectors from a common origin.

101. (previously presented) The method of claim 100, wherein the formulating the search query refinement suggestion further comprises:

multiplying, by a constant, those of the normalized term vectors that include constituent terms with the received search query to downwardly weight the constituent terms to produce an independence of the clusters from the terms of the received search query.

102. (previously presented) The method of claim 100, further comprising:

assigning a relevance score to the search result documents,

wherein the formulating the search query refinement suggestion further includes:

ranking the clusters based on the relevance score and a number of search documents in the clusters.

103. (previously presented) The method of claim 102, wherein the formulating the search query refinement suggestion further comprises:

selecting ones of the clusters based on the ranking.

104. (previously presented) The method of claim 103, wherein the formulating the search query refinement suggestion further comprises:

computing a centroid for each of the selected clusters; and

determining a score for each unique search query in the selected clusters based on the centroids.

105. (previously presented) The method of claim 104, wherein the computing the score for each of the unique search queries comprises:

multiplying a frequency of the issued search queries in the identified query-document associations in the selected clusters times a length of a distance vector measured from the term vectors of the issued search queries in the identified query-document associations to the centroids of the selected clusters.

106. (previously presented) The method of claim 104, wherein the formulating the search query refinement suggestion further comprises:

designating a name to each of the selected clusters based on the computed scores of the unique search queries of the selected clusters.

107. (previously presented) The method of claim 106, wherein the formulating the search query refinement suggestion further comprises:

comparing the computed scores of the unique search queries of the named clusters to a threshold; and

selecting those cluster names that exceed the threshold to obtain the search query refinement suggestions.

108. (previously presented) The method of claim 107, wherein the formulating the search query refinement suggestion further comprises:

sorting the obtained search query refinement suggestions based on a relevance score assigned to each of the search result documents corresponding to the search documents in the query-document associations associated with the named clusters and a number of the search documents in the named clusters.

109. (previously presented) The method of claim 108, further comprising:

presenting the sorted search query refinement suggestions to a user.

110. (previously presented) The method of claim 108, further comprising:

augmenting the sorted search query refinement suggestions with supplemental queries that include one or more of the terms of the search query and negated forms of all terms appearing in the set of search query refinement suggestions, but not appearing in the search query; and

presenting the augmented search query refinement suggestions to a user.

111. (previously presented) A system comprising:

means for storing a plurality of query-document associations, each query-document association including a one-to-one pairing of a search query and a search document;

means for receiving a search query;

means for identifying a set of search result documents using the received search query;

means for identifying search result documents ~~to~~ in the identified set of search result documents that match one or more of the stored search documents;

means for identifying, for each of the stored search documents that matches one of the identified search result documents, a query-document association of the plurality of query-document associations; and

means for formulating a search query refinement suggestion for the received search query based on the identified query-document associations.

112. (currently amended) A method, performed by a device, the method comprising:

creating, by a processor of the device, a query source reference, including:

identifying, by the processor, associations between issued search queries and retrieved search documents in a one-to-one relation, and

assigning, by the processor, a weight to each of the associations;

receiving, by the processor, a search query; and

formulating, by the processor, a refinement suggestion for the received search query using the query source reference.

113. (previously presented) The method of claim 112, further comprising:
obtaining at least one search result document using the received search query,
wherein the formulating the search query refinement suggestion further
comprises:
comparing the at least one search result document to the retrieved search
documents,
identifying the retrieved search documents that match the at least one search result
document, and
using the issued search queries associated with the identified search documents in
the formulating.

114. (previously presented) The method of claim 113, wherein the formulating
the search query refinement suggestion further comprises:
computing term vectors using terms in the issued search queries associated with
the identified search documents and the assigned weights.

115. (previously presented) The method of claim 112, wherein the formulating
the search query refinement suggestion further comprises:
ranking the search query refinement suggestion based on the computed term
vectors,
wherein the method further comprises:
presenting the ranked search query refinement suggestion to a user.

116. (previously presented) A system comprising:
means for creating a query source reference, including:
means for identifying associations between issued search queries and retrieved
search documents in a one-to-one relation, and
means for assigning a weight to each of the associations;
means for receiving a search query; and
means for formulating a refinement suggestion for the received search query
using the query source reference.

117. (currently amended) A computer-readable memory device ~~medium~~
configured to store instructions executable by at least one processor to cause the at least
one processor to:
create a query source reference, including:
identifying associations between issued search queries and retrieved
search documents in a one-to-one relation, and
assigning a weight to each of the associations;
receive a search query; and
formulate a refinement suggestion for the received search query using the
query source reference.